

**ANALYSIS OF
WATER RESOURCE
MANAGEMENT ALTERNATIVES**

SUMMARY REPORT



Cape Cod National Seashore



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WATER RESOURCE
MANAGEMENT ALTERNATIVES
SUMMARY REPORT**

Prepared by

Office of Scientific Studies
North Atlantic Region
National Park Service
Department of the Interior

In cooperation with
Cape Cod National Seashore

June 1981

Cape Cod National Seashore

Preface

The Analysis of Water Resource Management Alternatives is part of the National Park Service's planning process designed to produce a Water Resource Management Plan for Cape Cod National Seashore. The report is written to encourage public review and to clarify the water resource management goals for Cape Cod National Seashore. In some cases, the management objectives of the National Park Service may not completely coincide with the objectives of all other Cape groups and citizens; however, there are also many common objectives for the preservation of the outer Cape's water resources. We hope this report will contribute to the information on the water resources of the outer Cape and encourage communication and action on water resource protection among concerned citizens and at all levels of government.

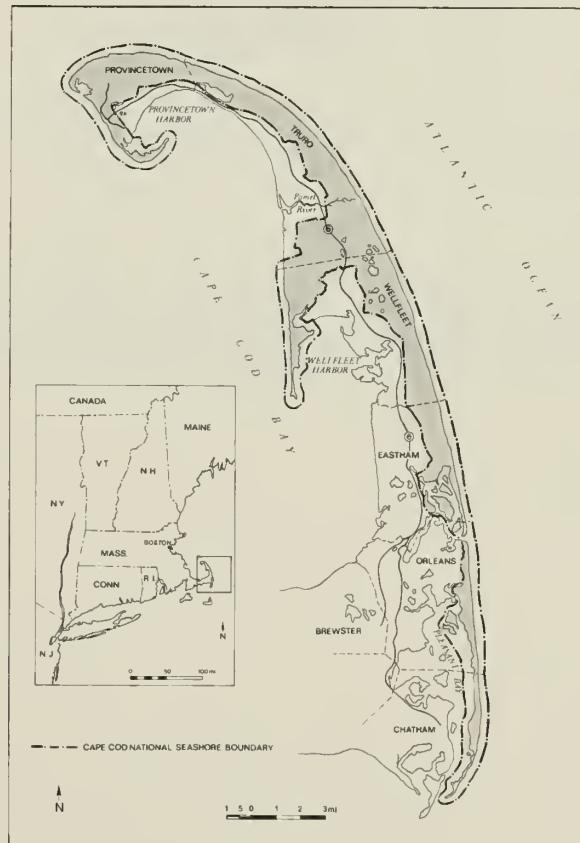
Section I

Introduction

Cape Cod, an area of outstanding beauty, with diverse natural ecosystems and cultural heritage, is ecologically fragile and vulnerable to threats from population growth and development. The water resources on the outer Cape are particularly vulnerable to degradation. During the last decade, there has been increasing evidence of both current and potential water resource problems and associated adverse ecological and economic impacts. As part of the local, regional, and national efforts to respond to these problems and protect water resources, the National Park Service is developing a Water Resource Management Plan for Cape Cod National Seashore. This Analysis of Water Resource Management Alternatives is part of the preparation of the Plan.

PURPOSE OF THE WATER RESOURCE MANAGEMENT PLAN

The purpose of the Plan is to define management actions for the protection and compatible use of the park's water resources.



Regional Location of Cape Cod National Seashore.

PLANNING STEPS FOR THE WATER RESOURCE MANAGEMENT PLAN

Selection of a particular management program depends on scientific research and management, and is guided by comments received during the public review of the Analysis of Water Resource Management Alternatives.

Steps for Preparation of Water Resource Management Plan

- Step 1** Preparation of Analysis of Water Resource Management Alternatives (with Environmental Assessment) and a Summary Report.
 - Step 2** 60-day Public Review and Comment Period.
 - Step 3** Preparation of Record of Decision containing the water resource management alternatives selected by the National Park Service after consideration of public comments.
 - Step 4** 30-day Public Review of the Record of Decision.
 - Step 5** Preparation of the Final Water Resource Management Plan.
 - Step 6** 30-day Public Review of the Final Water Resource Management Plan.
 - Step 7** Plan Implementation by the National Park Service, Cape Cod National Seashore.
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This the most direct sequence of steps, however, the planning process is flexible and can incorporate necessary changes during plan development.

Section II

National Park Service Policies and Jurisdiction

NATIONAL PARK SERVICE MANAGEMENT POLICIES

The general management policies that guide management of national parks are based in the legislation establishing the National Park Service as well as the legislation for individual parks. Preservation and compatible use of a park's natural and cultural resources are the primary purposes of national parks and require long-term planning. Management decisions on the extent and nature of proposed uses and development activities within a national park are based on general management policies and park-specific management objectives.

For management of park areas, preservation of entire ecosystems and not simply specific biological or historic features is a significant aspect of National Park Service policy. Since ecosystems are the functional units of nature, successful management must maintain the integrity of those systems, and seek to avoid alteration or interferences with natural ecosystem processes that perpetuate these systems. Management requires an understanding of the ecosystems in an area and the relationship between the natural environment and the cultural resources. This understanding is achieved through management experience and through scientific research in natural and social sciences.

Integration with the surrounding communities is an asset to national parks, yet may render parks vulnerable to pressure for development or resource use. Conflicts are addressed during the development of park resource management programs.

Today, many national parks are threatened by impacts whose source is outside park boundaries and park jurisdiction. Consequently, protection of national parks can be most successfully accomplished with the support of neighboring communities and the surrounding region.

WATER RESOURCE MANAGEMENT OBJECTIVES

Management objectives are determined in part by the legislation establishing a park and are reflected in park plans. The objectives for water resource management reflect the significance of these resources in the total network of natural and human systems.

1. To protect the natural processes of the water cycle from disturbance and thus preserve diverse ecological systems dependent on natural water levels and water quality.
2. To maintain or restore the quality of water resources through resource management actions and through cooperation with local communities and regional, state and federal agencies.
3. To contribute to the scientific base for water resource management and perform or coordinate water resource research.
4. To promote public awareness of the water resources of outer Cape Cod and an understanding of current and potential human impacts upon these resources.
5. To promote water conservation through direct National Park Service action and through cooperation with local communities and with regional, state and federal agencies.

RESPONSIBILITY FOR WATER RESOURCE MANAGEMENT

With the establishment of the Seashore, the National Park Service was given responsibility for management of the park area. However, water resource-related laws and programs administered by other agencies influence water resource management within Cape Cod National Seashore. In some cases, coordinated management or cooperative programs may be beneficial.

Section III Water Resources

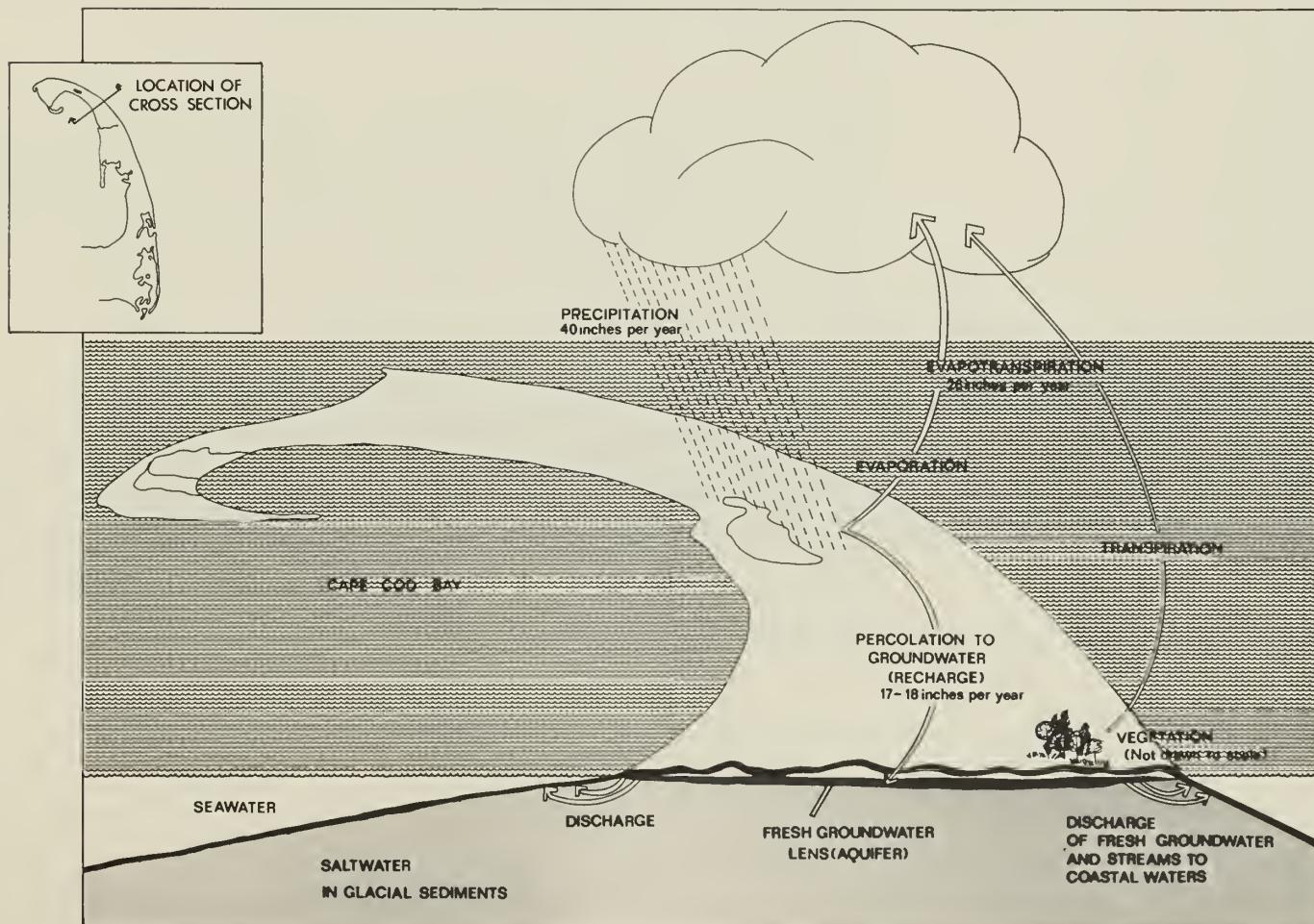
DESCRIPTION OF WATER RESOURCES

Water is a unique chemical substance, necessary for many life processes, and plays an important role in ecosystems. The freshwater aquifer provides the only source of drinking water on the outer Cape.

For purposes of this report, a water resource is defined as a body of water that exists for at least part of the year. The water resources are classified into three major types: freshwater, saltwater and floodplains.

The wide diversity of water resources and associated biological communities are a result of the Cape's geological history as well as environmental forces that continue to shape the area. The wide variety of water resources are interconnected parts of a water cycle.

Brief descriptions of each water resource are presented.



Local Cape Cod Water Cycle.

PRESENT STATUS OF WATER RESOURCES

The rapid population growth and the increase in tourism on the Cape since the mid-1900's, have created changes in land and water resource use that can impact water resources. Park-related activities (such as recreation) and certain types of land use on areas adjacent to the park or on non-federal land within the park boundary can adversely impact water resources.

The vulnerabilities and the human uses and benefits from each water resource type are identified. National Park Service policies emphasize the inherent water needs of ecosystems for their preservation.

Water Quality

There are state water quality standards for surface waters, but not for ground water. All surface waters in and adjacent to the Seashore are designated National Resource Waters, the highest state protection category. Coastal waters off Cape Cod are also designated as an Ocean Sanctuary by the Commonwealth.

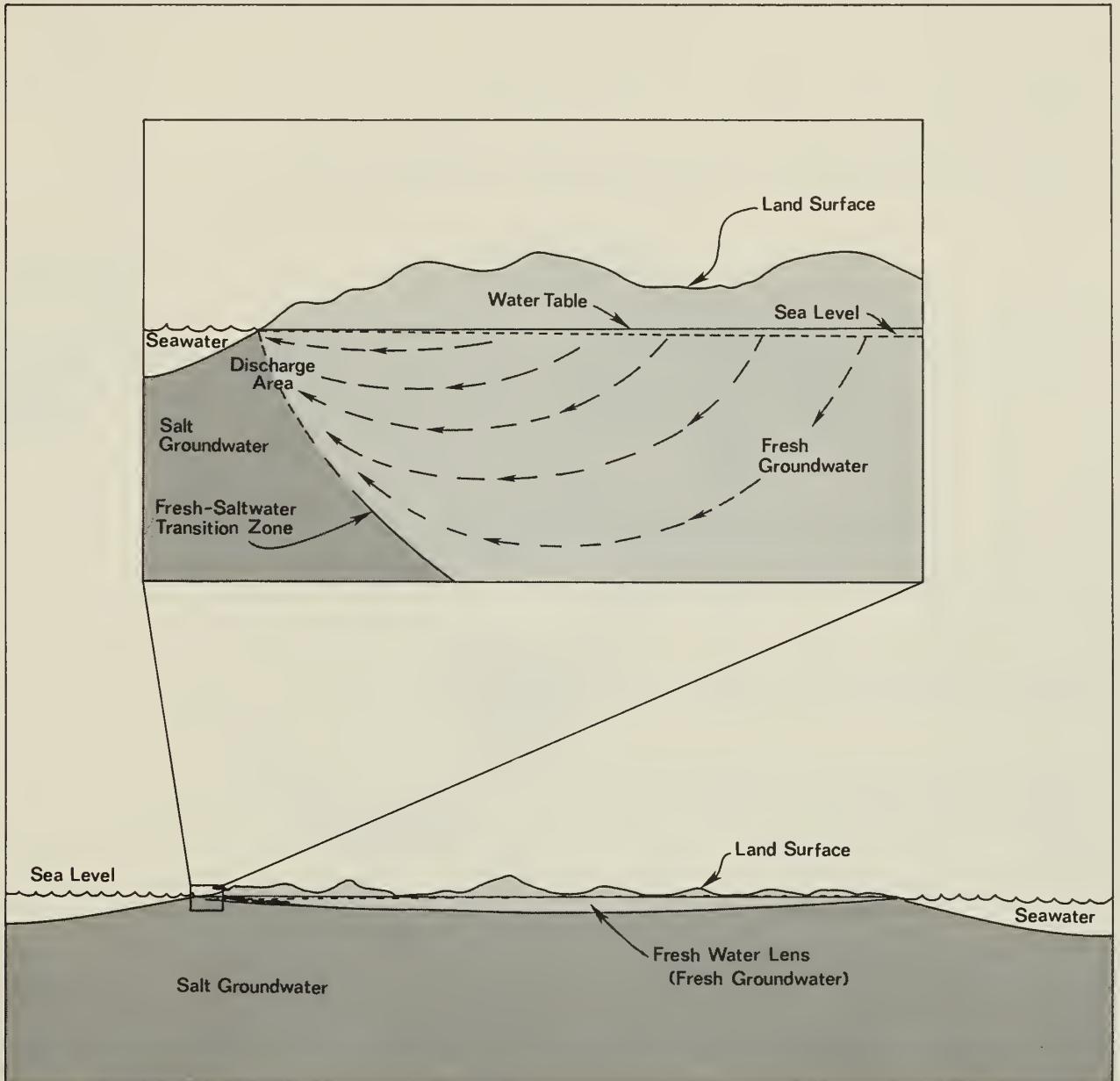
There are no known violations of water quality standards in the fresh surface waters in the park. However, certain kettle ponds, Pilgrim Lake, and the Herring and Pamet Rivers have some water quality problems.

The ground water on Cape Cod is generally of high quality. The most frequently encountered problems are elevated concentrations of salt, nitrogen (as nitrate), iron and manganese.

There are no known violations of water quality standards for coastal waters within the Seashore. However, there are some water quality problems adjacent to the park boundary in Provincetown and Wellfleet Harbors. Since 1972, there have been annual closures of shellfish harvesting due to red tide in certain locations in Eastham and Orleans. Twice during the three-year period between 1976 and 1979, oil from cargo vessels washed up on the shores of the outer Cape.

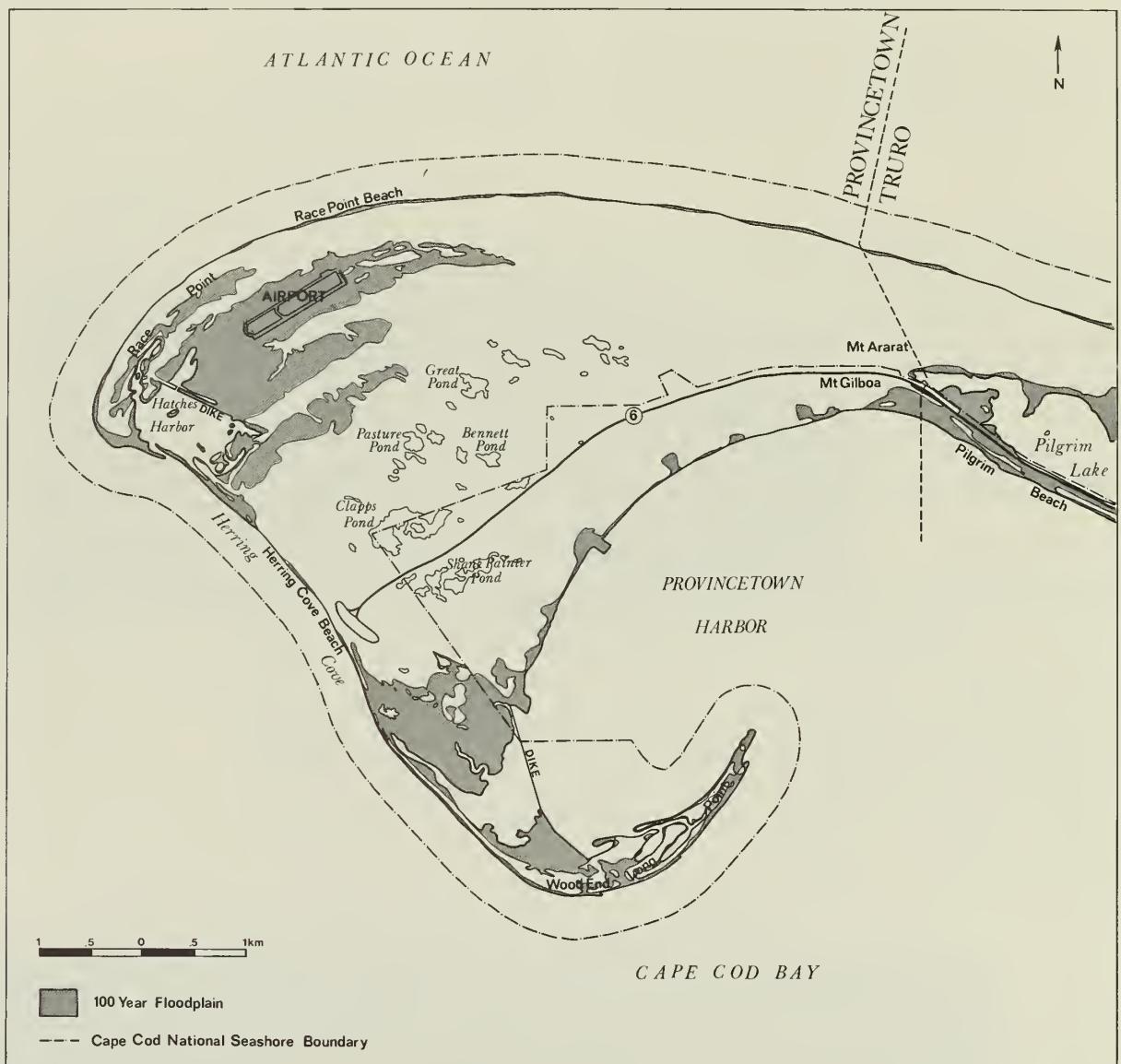
Water Quantity

Precipitation on the outer Cape averages 40 inches per year and evapotranspiration is estimated to be 25-26 inches per year. Annual recharge is estimated to be 17-18 inches per year. This natural amount of recharge is necessary to retain the historic shape of the fresh ground water lenses and the amount of discharge to adjacent water resources. There are yearly and seasonal fluctuations in the elevation of the water table.



Schematic Cross-sectional Detail of a Ground Water Lens of the Cape Cod Aquifer.

The diagrams are drawn approximately to scale for a cross-section through the North Truro lens.



Floodplain Management and Wetland Protection

The 100-year floodplain and wetlands within the Seashore are mapped and the National Park Service-managed structures and facilities located within these areas are identified.

Water Resources Monitoring

Monitoring water quality and quantity is performed by a number of organizations.

Section IV

Environmental Assessment of Management Alternatives

INTRODUCTION

Water resource management from the perspective of the National Park Service requires protection of water quality and quantity within the park's ecosystems. Seven current or potential water resource problems within the Seashore, alternatives for management and anticipated impacts from each alternative are discussed.

WATER RESOURCE PROBLEM DESCRI- PTIONS AND ASSESSMENT OF MANAGEMENT ALTERNATIVES

Ground Water Quantity

National Park Service policies and legal constraints on removal and consumptive use of resources, and the outer Cape's water resource limitations, create a potential conflict with the increased demand for use of ground water resources.

Alternatives for Management:

- 1) No additional management action.

All current water quantity management and compliance with legal requirements would continue.

- 2) Develop a comprehensive Public Information and Water Conservation Program for Cape Cod National Seashore. (Preferred Alternative)

This alternative would be in addition to management action in Alternative 1. The Program would include but not be limited to: a) installation of water saving devices; b) public education interpretation; and c) participation in local public education forums and planning meetings.

Research proposed.

Ground Water Quality

Ground water quality is threatened by certain activities and land use within and adjacent to the Seashore.

Alternatives for Management:

- 1) No additional management action.

All current management practices would continue.

- 2) Develop a Ground Water Quality Program for Cape Cod National Seashore.

This alternative would be in addition to all current management action in Alternative 1. The Program would include but not be limited to: a) development of a park system for septic treatment and disposal; b) development of a park solid waste recycling center; c) control use of pesticides and herbicides on park land; d) interpretation and education; and e) removal of park buildings from sensitive water resource areas.

- 3) Participate in the Development of a Cooperative Ground Water Quality Program. (Preferred Alternative)

This alternative would be in addition to all current management action in Alternative 1. The Program would include but not be limited to: a) meet with adjacent towns to plan for septic treatment and disposal; b) meet with local towns to coordinate solid waste recycling programs; c) prepare and enter into a cooperative agreement with the Commonwealth of Massachusetts and with local communities to eliminate or reduce the persistent use of salt on roads within and adjacent to the park; d) prepare and enter into a cooperative agreement with adjacent towns and agencies of the Commonwealth to eliminate or reduce the use of pesticides and herbicides within the park boundary; e) develop interpretation and education programs; and f) remove park buildings from sensitive water resource areas.

No research proposed.

Freshwater Kettle Ponds

Research on the kettle ponds indicates current and potential water quality problems including excess nutrient addition, sediment addition, possible health hazards from bacterial contamination, possible chemical pollution, and potential acid rain impacts.

Alternatives for Management:

- 1) No additional management action.

All current pond management would continue.

- 2) National Park Service Pond-Specific Management Plans.

Each pond plan would address problems specific to the pond but would include sections on shoreline ownership, public access routes, erosion control, nutrient input, public restroom facilities, adjacent land use, water level and water quality monitoring, scientific research, enforcement of pond rules and public information program.

3) Cooperative Pond-Specific Management Plans. (Preferred Alternative)

This alternative would be in addition to the pond management planning in Alternative 2. This alternative would involve formation of individual pond management committees during the formation and implementation of each pond-specific plan. Committee membership would include National Park Service staff, pond shoreline owners, and on Great Ponds, a representative from the State.

Continuation of current research and proposed research.

Gull Pond Sluiceway

Maintenance of the sluiceway to allow passage of herring into Gull Pond is manipulation of the environment in order to retard a natural shoreline deposition process.

Alternatives for Management:

- 1) No additional management action.
- 2) Maintain an open sluiceway. (Preferred Alternative)

Continuation of current research.

Pilgrim Lake

There are water quality problems in Pilgrim Lake. The eutrophic conditions, consistent blue-green algae blooms and periodic population outbreaks of midges are influenced by activities on land around the lake and by the lake's water level.

Alternatives for Management:

- 1) No additional management action.
- 2) Develop a Management Program and Cooperative Management Agreement for Pilgrim Lake. (Preferred Alternative)

Under this alternative, the National Park Service would assess the status of Pilgrim Lake and develop specific management actions. A cooperative agreement with several agencies in the Commonwealth of Massachusetts would be an important part of this Management Program.

Research proposed.

Water and Marsh Areas Near the Herring River Dike

The repair of the Herring River dike in 1974 altered the pattern of tidal flow to the marsh areas behind the dike and thus changed the biological community. There is an active program of mosquito control ditch maintenance and cleaning in the marsh that is adversely impacting the ecology of the upstream freshwater marsh.

Alternatives for Management:

- 1) No additional management action.
- 2) Develop a Management Program for Herring River and Associated Marsh Ecosystems. (Preferred Alternative)

The Program would include but not be limited to: a) issuance of a public statement of opinion from the Seashore; b) formation of a cooperative agreement with the Massachusetts Division of Waterways and the Town of Wellfleet; c) acquisition of two pieces of private property in the 100-year floodplain that are threatened by flooding (subject to funding and existence of a willing seller); and d) formation of a cooperative agreement with Cape Cod Mosquito Control Project.

Research proposed.

Wetland Protection

Recent observations indicate freshwater wetland areas within the Seashore are being adversely impacted by current mosquito control activities.

Alternatives for Management:

- 1) No additional management action. All current management would continue.
- 2) Develop an Integrated Pest Management Program for mosquito control within the park through a cooperative agreement with Cape Cod Mosquito Control Project. (Preferred Alternative)
- 3) Discontinue all routine mosquito control activities within the Seashore.

Research proposed.

